Pragmatic Factors Influencing Existential Determiners in Child Spanish

Research Thesis

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by

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Abstract

Early work on developmental semantics (e.g. Beilin & Lust, 1975) investigated what children knew about logical language, including quantifiers such as *some,* and concluded that children were not adult-like in their comprehension. However, others (e.g. Chierchia et al. 1998) were able to demonstrate children's understanding of *some,* with respect to inferences referred to as pragmatic implicatures, in the terms of Grice (1975) and Horn (1972). Seeking to make certain interpretations easier to grasp by ensuring that experimental contexts follow a discourse structure that answers what is referred to as the Question Under Discussion (e.g. Roberts 1996, 2004), Gualmini et al. (2008) showed that children could demonstrate more adult-like comprehension of ambiguous sentences, if the hard-to-access interpretation was the answer to an implicit Question Under Discussion. An explicit Question Under Discussion design has not yet been used in studies of children's interpretations of *some* and its associated *some, but not all* pragmatically enriched interpretation. In the current study, we pursue this question. Our project administered a Truth Value Judgment Task (TVJT) to monolingual Spanish-speakers in Mexico City, including 60 adults (mean age = 305.49 months, or 25;6 years, SD= 63.0 months) and 42 children (mean age = 70.65 months, or 5;10 years, SD = 5.7 months). To study *some* in Spanish, we looked at both *unos* and *algunos*, which are the Spanish version of *some,* which previous work has suggested that children understand (Vargas-Tokuda et al., 2009). Because *unos* and *algunos* are similar, but subtly different, quantifiers (Gutiérrez-Rexach, 2001; López-Palma, 2007), participants were assigned to either *unos* or *algunos* conditions, in a partially between-subjects design, to avoid confusion. Results showed that adults generated a *some, but not all* implicature with *algunos*, but not with *unos*, which is consistent with, though more categorical than, findings from previous research. In contrast with previous research, the children in our sample did not

generate an implicature with either *algunos* or *unos*. Future research will investigate predicate type as a potential source for this distinction with previous research in child interpretations. I discuss the significance of the more categorical adult judgments, as they contribute to the collective knowledge of implicature generation and linguistics

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Chapter 1 – Introduction

Consider the following exchange between a student and her thesis advisor:

Student: "If I am set to defend my thesis next month, when should it be finished?

Advisor: "*Some* students submit their theses a month before the defense, but two weeks should be fine."

Exchanges such as this one happen in daily conversation, but very rarely, as L1 speakers of English, do we give much thought to the underlying linguistic phenomena at work. While logic gives one meaning to words, pragmatics often gives another. Take the italicized *some*, for example. In an effort to quell the anxious student, or perhaps scare her out of procrastinating, the advisor has tapped into the pragmatic interpretation of the quantifier, through which it can be understood to mean "some, but not all." While some of the students who write theses turn them in with weeks to spare, it is not a requirement for all. Had it been, we assume that the advisor would have used the most specific term available and have said, "All students submit their theses a month before the defense." Additionally, the advisor has felicitously answered the explicitly posed question of the student, creating a pragmatically acceptable exchange that meets conversational expectations.

As exhibited above, words like *some* can have more than one type of interpretation. There is evidence that children have knowledge of the logical vs. the pragmatically enriched interpretations of the existential quantifier *some*. However, the existing literature on the topic is confounded by the use of experimental stimuli that differ in important ways across studies. Though limited, research with Spanish-speaking children (i.e. Vargas-Tokuda et al., 2009) shows that children understand the pragmatic implicature that can be associated with one existential quantifier, *algunos*, but that cannot associate with the other, *unos*. The findings of this study,

while noteworthy, are nevertheless bound by a few methodological limitations. Firstly, the stimuli were presented "live" by researchers, as opposed to video recordings; by choosing the latter, one could potentially improve the odds that all participants receive the same material and control factors like stimuli prosody. Secondly, Vargas-Tokuda et al. (2009) only utilized one verb in their Experiment 1 stimuli: *brincar*, or "to jump" in English. In order to study whether children can generate implicatures more generally, as opposed to with this specific verb, it could be considered advisable to use a variety of predicates. Finally, the researchers did not consider the role of the Question Under Discussion (Roberts, 1996) has on implicature saliency. By utilizing video recordings, a variety of predicates, and an explicit Question Under Discussion, these limitations are removed by the methodology of the present study. In doing so, we seek to further understand how children generate implicatures and if they do so at a rate similar to adults.

Chapter 2 – Literature Review

2.1 Scalar Implicatures

Often times in conversation, a speaker's meaning can be understood as both what they explicitly say, i.e. the logical interpretation of the statement, and what they implicate, i.e. the pragmatic interpretation thereof. As coined by H.P. Grice (1975), an implicature is generated when speakers convey extralinguistic meaning in their exchanges. Expanding upon Grice, Grundy (1995) explains implicatures as "meaning that is implied, i.e. conveyed indirectly or through hints, and understood implicitly without ever being explicitly stated" (p. 37). The presence of an implicature assumes that interlocutors are abiding by the Gricean Cooperative Principle (Grice, 1975), which stipulates that speakers make conversation contributions that are required at the stage at which they occur, and abide by the previously accepted direction of the

talk exchange in which they are engaged. Essentially, that speakers are following basic conversational norms and being cooperative can be viewed as a precursor for implicature generation. Implicatures can be divided into the categories of conventional and conversational, the latter of which can then further be separated into generalized and particularized implicatures, which differ in the degree to which they depend on context. Examples of statements containing implicatures are shown in the following exchange:

1. Speaker A: “I have an extra ticket for the concert tonight! Would you like to come?”
2. Speaker B: “I have to babysit my niece and nephew.”

Those with pragmatic understanding of the English language understand Speaker B’s statement as a rejection of the invitation of Speaker A. While not explicitly stated, the 2nd participant has declined this invitation.

Specifying further still, scalar implicatures are a type of generalized conversational implicature that arise when the speaker utilizes certain scales of value. In doing so, the speaker quantifies their statement with language that provides as much information as is needed to the listener, and no more (Grice, 1975; Horn, 1972). This “scalar language” prompts listeners to invoke a mental schema in which the values of words come to have meaning in relationship to others of the same scale in the lexicon. For example, in English, quantifiers could be said to exist along a scale from weak (*few, some*) to strong (*most, all*) in which words with stronger meanings often entail weaker ones. Thus, when someone eats *all* the cookies on a plate, the statement “I ate *some* cookies” would technically be considered true. This is due to the fact that if one has eaten *all* of the cookies, one has also eaten *some* of them. However, such a statement would not be the

most informative contribution in the context, given the presence of a more informative quantifier on the scale, namely *all*. In this way, *all* entails *some*, but not vice-versa. Other pragmatic scales have been proposed to account for other dimensions of meaning, including inclusive vs. exclusive *or* (e.g. Chierchia et al., 1998) and collectivity and distributivity (e.g. Beghelli & Stowell, 1997; Dotlačil, 2010; Padilla-Reyes et al., under review).

As alluded to above, scalar implicatures are inferences that can be drawn, on the basis of the plausible use of language, in a particular context. This is distinct from entailments, for example, which do not depend on context for their meaning. In the following examples, we see that the "covert partitive" or "some, but not all" implicature associated with *some* can be canceled using the "in fact" test, proposed by Grice (1975), while the existence entailment of the quantifier *all* cannot be canceled.

3. Some students went to class, in fact, all of them did.

4. #All students went to class, in fact, some of them did.

In summation, implicatures are utilized in every day exchanges between interlocutors to enrich the given logical context with additional pragmatic interpretations. Of specific interest for the purposes of our study are scalar implicatures, with which we will continue to engage throughout the paper. We seek to better understand the conditions under which adults generate such implicatures and in doing so, gain a better understanding of how children come to develop this knowledge. One of those said conditions is the overt presence of a Question Under Discussion, which I will now examine.

2.2 Question Under Discussion

Related to the Gricean pragmatics, philosophers and linguists hypothesize about the acceptability of conversational contributions made in particular contexts. In order for a speaker's response in a conversation to be considered felicitous, or pragmatically appropriate, it has to be related in some way to the underlying theme that is being discussed. Some offer an alternative way to conceptualize this theme: as an underlying question. Collingwood (1940, p. 423), for example, asserts that, "a question, when logical, is said to 'arise.' A question that arises in a given situation is a question, which in that situation, has logically to be asked. One which does not arise is one which, in that situation, logically cannot be asked." Linguists have further asserted that, in line with Collingwood, all conversational contributions are answers to an implicit, or explicit, Question Under Discussion or QUD (e.g. Roberts, 1996). Thus, if the underlying QUD is "Who rescued the horse?", then a conversational contribution such as "Pigs rescued the horse" would be a felicitous answer. In contrast, "The horse was rescued and ran away" is less felicitous, because it is not directly relevant to the QUD.

The presence of a clear QUD and the speakers' engagement therewith have been factors of interest in linguistic study. Clifton and Frazier (2012) examined the role of the QUD in adult English discourse enhancement and clarity. Unlike previous perspectives that considered the QUD to be derived from a large quantity of possibilities through "backwards inference," they suggest that "readers may consider only a small number of likely QUDs" (p. 353). These QUDs can be introduced in a variety of ways, be they explicitly posed or introduced through inferences or implicatures. They varied the presentation of the QUD to examine its impact on discourse interpretation.

In their 2012 study, Clifton and Frazier performed three experiments in which adult

participants read statements with either explicit or implicit QUDs of varying levels of clarity. In the first group, they combined verbal subcategorization preferences with an explicit Question Under Discussion, and found the role thereof to be central to understanding. They then presented utterances with implicit QUDs that in turn were not answered felicitously. They found that when material presented later in the discourse does not address the aforementioned QUD, "it is integrated only with some difficulty into the ongoing discourse, requiring a reinterpretation of the denial phrase" (p. 365); however, there were ambiguities regarding the role of the denial phrase. They set out to resolve this in Experiment 3, in which the denial phrase was presented as elliptical (e.g. "The material should have been released, *but Gorbachev didn't*, according to our source, notify the appropriate bureau"). In combination, the latter two experiments demonstrated evidence for their initial hypothesis; new information in subsequent discourse is easier for interlocutors to integrate when it addresses previously established QUDs. Further, explicitly stated QUDs enhance comprehension.

Not all developmental linguistic work measuring children's knowledge of semantics has taken the Question Under Discussion to heart when creating the experimental pragmatic contexts. However, in work in which this phenomenon is considered, adding an explicit QUD to a child language experiment examining children's quantifier scope interpretations allowed children to perform more like adults. In this project, however, we test the influence of adding different QUDs (i.e. *who* vs. *how many*) to experiments measuring what children know about pragmatic implicatures. Before turning to our specific research question, however, we will review what children are thought to know about pragmatic implicatures.

2.3 Children's Knowledge of Implicatures

In one of the pioneering studies presented on the topic, Noveck (2001) evaluated the preference for the logical versus pragmatic interpretation across participants. Specifically, in his third study titled "The French existential quantifier *Certains,* (*some*, in English)," he compared child and adult acceptance of individual level predicates (as in Carlson, 1977) such as "Some giraffes have long necks." The children, 8 year olds (n=31) and 10 year olds (n=30), were recruited from two small villages in the French Alps; the adults, (n=15) were volunteers from the same region. Both groups were presented with the same stimuli: sentences containing the quantifiers *some* and *all*. Noveck's stimuli are French translations of the stimuli of Smith (1980), though presented as statements and not yes-no questions. The results are not overwhelming and it is not clear that they are statistically different from chance.

Noveck claims that the results show that children are "more logical" than adults on the basis of them not appearing to generate pragmatic implicatures as much as adults do on his task. However, it must be said that his task, by virtue of using individual-level predicates, measure what children know about the world (i.e. Do all giraffes have long necks?) at least as much as they measure what children know about the sentences at hand. Thus, asking children about giraffes in general introduces a confound into the experiment because one is no long testing only what children know about semantics-pragmatics. Not using individual-level predicates is one way around this problem.

Nevertheless, in an English-language follow up to Noveck (2001), Feeney, Scrafton, Duckworth & Handley (2004) test the same types of sentences with individual-level predicates with the English quantifier *some*. In their replication, child English speakers (between ages 7;3 and 8;3) appeared more adult-like than they did in Noveck's study. Feeney et al. (2004) provide

pragmatic support for the sentences that children are presented with by accompanying them with pictures related to the predicates in the experimental sentences. Further, the predicates in their second experiment are activity-level predicates, and not individual-level predicates, including "I've eaten some (of the) sweets". While the appendix only lists predicates (e.g. "Eating sweets"), the example picture captions give sentences (e.g. "I've eaten some of the sweets."). It is noteworthy that the stimuli sentence they employ, however, includes an overt partitive structure "some <u>of the</u> sweets" which is distinct from the covert partitive structure "some giraffes" studied elsewhere. This in turn confounds their conclusions, which do indeed show more adult-like responding. However, it is unclear whether the more adult-like performance is because of the addition of the overt partitive, the use of the pictures (which Noveck did not have) and/or whether it is because of the use of activity predicates, instead of individual-level predicates. It is interesting to note that in their 3rd experiment, Feeney et al. (2004) added a working memory task (digit span), which was given to adults, along with Smith/Noveck-type individual-level predicates sentences. They found a significant correlation between working memory score and the ability to reject *some* in infelicitous contexts (e.g. *Some cats have four legs.*). While we were unable to incorporate a similar measure into our present study, we are working to engage a working memory test into the following trial of the experiment.

As examined, Noveck (2001) and Feeney et al. (2004) both test children's knowledge of implicatures. Shifting slightly, other researchers of child implicature knowledge and more broadly, child language acquisition, give particular interest to children's development of logical reasoning. Generally, in the domain of linguistic knowledge referred to as Logical Form, it is claimed that the truth conditions of "logical words" (i.e. propositional operators, *and* and *or*, quantificational devices, *some* and *every*) are calculated. Some authors argue that as soon as

these words begin to enter their speech, children are capable of grasping their meaning. These truth judgment abilities fall under the realm of pragmatic development, about which previous research had been mixed.

According to Chierchia, Crain, Guasti, and Thornton (1998), if one assumes that semantic knowledge is part of the innate linguistic endowment of the learner, the same should be true for certain aspects of pragmatic knowledge. This knowledge would include the Gricean pragmatic maxims, specifically those that are not dependent upon one's world knowledge like generalized conversational implicatures. The subsequent hypothesis would be that access to these implicatures would give children similar pragmatic abilities as adults.

"Analysis of quantifiers and logical connectives includes both a truth conditional component and a pragmatic component that… contains implicatures of various kinds" (p. 101). Because of the scalar implicatures associated with *some* and *or*, certain contexts can become pragmatically inadequate when these implicatures are violated. Chierchia et al. (1998) conducted two studies with both English-speaking children and Italian-speaking children to test their hypothesis. In the first experiment with *some*, children were presented with scenarios in which 3/4 and 4/4 dwarves went for a boat ride. At rates of approximately 86% and 66%, the English and Italian speaking children rejected the 4/4 scenario as being felicitous with *some*. In the second *or* study, children were presented with similar Truth Value Judgment Tasks. In examples in which the implicature was maintained but not upheld (ex. The troll actually ate both pizza and ice cream, but the statement used *or*), children accepted them less than 1/3 of the time. However, when the implicature of exclusivity was cancelled, there was a 100% acceptance rate from both the English and Italian speaking children. Based on the acceptability of the scenarios by both groups of children, Chierchia et al. concluded, "it seems likely that children employ a

mechanism for inferencing which is consistent with a classical notion of logical consequence" (p. 105). Their pragmatic understanding is such that they appear to employ the use of truth. In sum, child English-speakers and child Italian-speakers appeared to be able to generate and cancel pragmatic implicatures associated with the quantifier *some* ("some, but not all") and the disjunctive operator *or* ("either x or y, but not both"). This study in particular builds a strong case for utilizing Truth Value Judgment Task (TVJT), an experimental methodology that will consequently be replicated, with slight variation, in the remaining studies of this section.

While Noveck (2001) examined quantifiers in French, Feeney et al. (2004) in English, and Chierchia et al. (1998) in English and Italian**,** Papafragou & Musolino (2003) hypothesized about the ability of Greek-speaking children to generate scalar implicatures. As noted in the later, a defining feature of pragmatic knowledge is that it is extralinguistic, such that related phenomena could be observed cross-linguistically. Thus, while they contain variation, the results of the studies can be compared within and across languages.

Similarly to our experiment, Papafragou & Musolino's (2003) main goals were two fold: demonstrating, for adults, that scalar implicatures are produced regularly under given conditions, and examining children's capability to produce the same implicatures. Taking a slightly different approach, the researchers created stimuli with both logical and non-logical vocabulary, including numerical scales. In this way, they hoped to further isolate which factors are the most influential in children's generation of implicatures, from a developmental perspective. They conducted two different experiments with 30 preschool aged children (mean age 5;3) and 30 adults, the first of which examined the scalar terms *some, two,* and *start* (in Greek, *meriki*, *dio*, and *arxizo*). Utilizing a TVJT, researchers acted out various scenarios with small toys or props for the children; adults were shown videos of the same items with the same sentences. In the sentences,

for examples, "*some* of the horses jumped over the log" when in fact, all of them did. Participants then had to decide if the puppet answered the question "well" and provide justification for their answers. Unsurprisingly, adults rejected the puppet's statement in each of the 3 conditions at incredibly high rates: 92.5%, 100%, and 92.5%, respectively. Unlike adults, 5-year-olds massively accepted the puppet's statements on the {*all, some*} and {*finish,* start} scales, i.e. 87.5% and 90% of the time, exhibiting that they did not generate the implicature that would make those statements infelicitous.

In the second trial, in order to increase children's awareness of the goal of the experiment, Papafragou and Musolino (2003) implemented 3 modifications: training, adjustment of stimuli to increase saliency of the main actor's action, and a shift in the puppet's commentary to be more specific to the main character's performance. As a result of these changes, the children's implicature generations and consequential rejection of the statements skyrocketed: children rejected the statements 52.5% of the time for the {*all, some*} scale, 47.5% for {*finish, start*}, and 90% for {*three, two*}. While these outcomes are still not at the same level as adults, they show promise that children do possess the ability to generate scalar implicature with appropriate training and stimuli. However, as aforementioned regarding Feeney et al. (2004), these stimuli also utilize an overt partitive structure (i.e. all <u>of the</u> horses jumped over the fence), which could be considered a confounding factor and is something we worked to eliminate in our study.

Thus, as established in Noveck (2001), and discussed in reference to Papafragou and Musolino (2003), some linguists have found that children do not seem to derive scalar implicatures at the same rate as adults. In the later study, it was noted that children's performance improved with training that draws their attention to specificity. To account for this,

two hypotheses were proposed: the Pragmatic Delay hypothesis and the Pragmatic Limitations hypothesis. The first states that children do not compute implicatures simply because they lack the prerequisites to do so, and thus develop them over time. The Pragmatic Limitations hypothesis maintains a slightly different view that while children can theoretically compute implicatures, "they do so to a lesser extent than adults in contexts that impose demands on processing resources" (p. 672, Guasti et al., 2005).

In their 2005 study, Guasti, Chierchia, Crain, Foppolo, Gualmini, and Meroni set out to analyze these hypotheses, with the aim of supporting the latter. In their baseline experiment, they recreated Noveck's 2001 study with 7-year-old Italian speaking children and adults. The subjects were presented with statements containing quantifiers *some* and *all* and had to evaluate them based on acceptability regarding informativeness. Interestingly, they had very similar outcomes to Noveck; children accept statements like "some giraffes have long necks*"* at rates of 87%, while adults did so at a rate of 50% (p. 675). To ensure that this outcome was not the result of children misunderstanding the task, the second condition included a training session, as was suggested by Papafragou and Musolino's 2003 study. Children who were trained to choose based on specificity rejected statements like "some giraffes had long necks*"* at much higher rates than those who did not receive training (52% rejection vs. 12%). However, when Guasti et al. re-tested the subjects from the second trial for training retention, rejection rates dropped dramatically (from 52% rejection to 22%). These findings suggest that "children's ability to reject under-informative statements is evident only when they are instructed to do so through training" (p. 683).

In their fourth and final experiment, Guasti et al. changed their methodology to a TVJT, thus giving the experimenter more control over the context and creation of implicatures. Most

importantly, they used activity predicates that were supported by the actions of the toys manipulated in their TVJT, in contrast to the experiments in Smith (1980), Noveck (2001) and Feeney et al. (2004). Notably, in this video based experiment, children rejected the critical statements at an almost adult like rate of 75% (adults had a rate of 83%) with no statistically significant difference between the response rates. In summation, these experiments demonstrate that 7 year olds can, and do, derive implicatures at adult like rates when the relevant evidence is made available by context. Thus, in the instances when children fail to derive implicatures, Guasti et al. suggest that it is not a lack of pragmatic competence, but rather various other contextual factors.

The Italian language findings of Guasti et al. (2005) seem to substantiate the Pragmatic Delay hypothesis and the continued investigation of children's knowledge of implicatures. Interestingly, the Spanish language creates a unique opportunity for the study of scalar implicatures, as it utilizes the pair of quantifiers *unos* and *algunos*. Unlike *unos,* which maintains a "some but not other" pragmatic implicature, *algunos* implies "some but not all" of the items in a hypothetical set. It is believed that the implicatures result from the contextual restriction, or lack thereof, of the quantifiers. They differ, however, regarding their ability to be cancelled; the "some but not all" connotation of *algunos* can be canceled in downward-entailing environments, while the implicature computed by *unos* cannot be canceled in said environments. Beyond implicatures, this pair presents an opportunity to study children's semantic versus pragmatic knowledge, which has been a heavily debated topic in the field. While the evidence from various studies has been mixed, it is plausible that children can both generate quantity implicatures associated with *some* (Papafragou & Musolino, 2003) and cancel them in downward entailing environments.

Vargas-Tokuda, Grinstead and Gutiérrez-Rexach (2009) examined this phenomenon in detail from the perspective of child language development, with hopes of understanding what knowledge typically developing Spanish-speaking children have regarding these implicatures. In their 2009 study, Vargas-Tokuda et al. conducted two experiments with 27 monolingual, Spanish-speaking children (ages 4;9-6;7, mean age=5;9) and 10 adults from Mexico City. In the first trial, the subjects were presented with a TVJT in which they had to accept or reject statements based on the presented scenarios, in all of which, a number of animals would jump over a girl. Thus, only one predicate is used in this experiment. Interestingly, the 5 year-olds rejected situations with *algunos* 70% of the time when 4/4 animals completed the action. When contrasted with the adult response rate of 80%, the children's mean judgment score was not significantly different (p. 111), suggesting that children were approaching adult-like interpretations. Findings indicated that children seemed to distinguish between the pair of quantifiers at a relatively young age. In the second experiment, the researchers found that "children could suspend the implicature associated with *algunos* in the downward-entailing environment created by the antecedent of a conditional (81%) at levels virtually identical to those of adults in [the] study (80%)" (p. 113). Additionally, the results of the similar TVJT showed that children had adult-like understanding regarding the irrelevance of the downward entailing context on the lexically-determined properties of *unos.*

In sum, the findings of Vargas-Tokuda et al. (2009) showed that children (age 5) are able to generate the adequate *algunos* implicatures and cancel them in downward entailing contexts. Children also demonstrated their knowledge that there is no equivalent implicature triggered by *unos* although the pair shares similar set interpretations. Though children seemed adult-like in this study, there are nonetheless a number of areas in which it could be improved. First, the

TVJTs were done "live", which always raises the concern that individual experimental items could be subject to variation in their presentations from one child to the next. In contrast a video-recorded presentation could provide greater reliability. Further, the use of *unos* and *algunos* was only tested with one predicate *brincar sobre la niña* or "jump over the girl". To have greater confidence of children's understanding of quantity implicatures and the quantifiers associated with them, it would be preferable to see these interpretation with a variety of predicates. Finally, Gualmini's work with quantifier scope, to which we will turn in Section 2.4, raises the question of whether a third experimental manipulation could provide great clarity with respect to child and adult knowledge of these constructs.

It is also important to note that Vargas-Tokuda et al. (2009) used a within-subjects design. It is possible that adult and child proportions of implicature generation could have been depressed by a certain confusion between the two quantifiers. Grinstead, Thorward, Ross, and Maynell (2010) report that a similar study, using phonetic variants of the English existential *some*, created enough confusion in participants that they switched to a between-subjects design in which participants heard only one of *some*'s phonetic variants. This could be valuable in Spanish as well.

As we conclude on the topic of children's knowledge of implicatures, it is noteworthy to also consider adult knowledge thereof. One of the most widely available sources of empirically substantiated adult knowledge of implicatures can be found in the adult control group results of child language studies. In the following table, we summarize the adult implicature generation results from the studies we have reviewed thus far. The two important patterns arise in the following table. First, that activity predicates (Chierchia et al., 1998; Feeney et al., 2004, Experiment 2; Guasti et al., 2005, Experiment 4) seem to be more associated with implicature

generation than are individual-level predicates (Noveck, 2001, Feeney et al., 2004, Experiment 1). Secondly, one can observe that explicit partitive structures (Feeney et al., 2004, Experiment 2, Papafragou & Musolino, 2003) seem to generate more implicatures than do implicit partitive structures (Noveck, 2001; Feeney et al., 2004, Experiment 1; Chierchia et al., 1998; Guasti et al., 2005; Vargas-Tokuda et al., 2009).

Author	**Language**	**Adult Percent Implicature Generation**	**Child Percent Implicature Generation**			
Noveck (2001) [a,c]	French	59%	11% (Ages 7-8)		15% (Ages 10-11)	
Feeney et al. (2004)[a,b,c,d]	English	35% (Exp. 1[a,c])	34% (Exp. 1[a,c])		79% (Exp. 2 [b,d])	
Chierchia et al. (1998)[b,c]	English Italian	No adults tested	86% (English)		66% (Italian)	
Papafragou & Musolino (2003)[b,d]	Greek	92.5% (Exp. 1)	12.5% (Exp. 1)		52.5% (Exp. 2)	
Guasti et al. (2005)[a,b,c]	Italian	50% (Exp. 1[a,c])	13% (Exp. 1[a,c])	52% (Exp. 2[a,c])	22% (Exp. 3[a,c])	75% (Exp. 4[b,c])
Vargas-Tokuda et al. (2009)[b,c]	Spanish	80%	70%			

Table 1 – Comparing Adult and Children's Percent Implicature Generation Across Studies

[a] Indicates that the experimental stimuli used **individual level predicates** (e.g. *Giraffes have long necks*).

[b] Indicates the use of **activity level predicates** (e.g. *Giraffes eat leaves*)

[c] Indicates the use of a **covert/implicit partitive** structure (e.g. *Some sweets*)

[d] Indicates the use of an **overt/explicit partitive** structure (e.g. *Some <u>of the</u> sweets*).

As displayed in the table, there are two prominent variables that are not systematically controlled in studies of child and adult existential quantifier interpretations. Specifically, child and adult abilities to generate conversational, scalar implicatures vary as a function of at least the following factors:

- **Predicate Type** – Some authors use individual level predicates (e.g. *Giraffes have long necks*), which may introduce a confound in the form of world knowledge being measured instead of plausible inferences about language use, which are typically the terms in which pragmatic implicatures are discussed (e.g. Grice 1975, Horn 1972). Other authors use non-individual level predicates, including activity and accomplishment predicates (Vendler, 1967).
- **Covert vs. Overt Partitives** – the truth-conditional semantics of noun phrases such as "some <u>of the</u> horses" are distinct from those of noun phrases such as "some horses." The former include at least the uniqueness presupposition (Russell, 1905) associated with definites, in the object of the preposition. Such a presupposition greatly decreases the degree to which inferences need to be made about the part-whole relationship of the noun modified by *some/some of the*. Given the presupposed character of the noun, it would seem much more difficult to cancel the "some, but not all" meaning associated with the overt partitive version, which is born out in the studies reviewed.

In our study, we utilize activity level predicates and a covert partitive structure. In what follows, we will consider the impact of controlling a third variable, namely, the Question Under Discussion, as a means of making prominent the set relationships that are most relevant to children's partitive, "some, but not all" pragmatic implicature judgments.

2.4 Children's Knowledge of the Question Under Discussion

In the debate on children's understanding of quantifier scope, it has been shown to be useful to manipulate the Question Under Discussion (QUD) variable. In their 2008 study, Gualmini, Hulsey, Hacquard & Fox (2008) considered the role to the QUD in an attempt to explain why children seem to have access to only one of the two interpretations of ambiguous sentences such as the following:

5. The detective didn't find two guys.

While adults are able to interpret this sentence to mean either that there were two guys that the detectives could not find (the inverse scope interpretation) or that the detective could not find any guys (the surface scope interpretation), children seem only able to grasp the latter and not the former. However, further research has shown that children can in fact understand the inverse scope interpretation of scopally ambiguous sentences containing negation. To explain this phenomenon, Gualmini et al. (2008) presented a new theory that cites the Question Answer Requirement (QAR) as the key difference between child and adult pragmatic understanding. The QAR states that every assertion is understood as an answer to a question, specifically the Question Under Discussion (QUD). The model presented shows how the presence of the QUD guides children's assignment of scope. Gualmini et al. suggest that children, like adults, interpret statements as answers to a particular question, thus following the QAR. This question may be overtly stated, but most often needs to be inferred based on contextual cues.

With these factors considered, Gualmini et al. (2008) tested children's ability to interpret scopally ambiguous sentences that contain negation and a quantifier. They found that when the

experiment manipulated the QUD to make it explicit and clear, children were able to access the inverse scope interpretations at higher rates than previously reported. This is due to the fact that children, like adults, prefer the scope assignment that permits them to answer the QUD and meet the Question-Answer Requirement. However, there were still cases in which children do not select inverse scope when adults do; it is suggested that this is what results when the experiment did not make the QUD salient enough.

To summarize, a rather multifaceted debate surrounds children's ability to generate implicatures. As has been established, it is possible to measure adult interpretations that include pragmatic implicatures across languages (see Table 1). Children, on the other hand, have proven somewhat more difficult to assess. For example, they are claimed to be "more logical" than adults (Noveck, 2001) but under conditions that arguably test their world knowledge as opposed to their pragmatic understanding. With methodological modifications, subsequent researchers have been able to show that children are able to generate scalar implicatures (Papafragou & Musolino, 2003; Guasti et al., 2005; Vargas-Tokuda et al., 2009). In these three studies specifically, children showed higher rates of implicature generation when the experiment utilized a TVJT. Additionally, other researchers theorize about the role of the Question Under Discussion in discourse enhancement and clarity (Clifton & Frazier, 2012), noting that an explicit QUD increases comprehension and make certain elements of discourse more salient. In accordance with this hypothesis, child language researchers (i.e. Gualmini et al., 2008) show that children demonstrate more adult-like comprehension of ambiguous sentences if the hard-to-access interpretation was the answer to an implicit QUD. However, to our knowledge, no one has yet examined the impact of an explicit QUD on children's ability to generate implicatures, which leads us to the following research questions for the study at hand.

2.5 Research Questions

1. Does an explicit QUD and between-subjects design matter for generation of pragmatic implicatures?

2. Does a "who" QUD vs. a "how many X" QUD matter for implicature generation? Does it matter for different ages?

3. Is there any impact, relative to previous studies (Vargas-Tokuda et al. 2009, in particular) to using a variety of predicates?

4. Does using a video-recorded TVJT improve adult or child performance, relative to existing studies?

5. Can children generate an implicature with *algunos*, but not *unos*, as in Vargas-Tokuda et al. (2009)?

Chapter 3 - Experiment 1

3.1 Methods

The first part of the experiment examined adult Spanish-speakers' ability to generate pragmatic implicatures. These findings are relevant as a comparison with the children who we test in the second part of the experiment, but are also of independent interest inasmuch as the levels of adult implicature generation vary widely across studies. Thus, simply to have a clear idea of what factors matter to adults is valuable. Further, with respect to the children, if they are unable to do what adults are able to do with implicature generation, we are faced with a developmental question, namely, how they become adults and acquire what they currently lack.

3.2 Participants

For the first part of the experiment, adult monolingual Spanish-speakers were surveyed for participation eligibility. In total, after accounting for filler failures, 60 adults were included in the sample (range: 18;4 - 37;1 years, mean age = 305.5 months, or 25;6 years SD = 63 months). Those with various speech or language issues did not qualify for the experiment, as these factors could confound the results. In this way, one adult was excluded on account of self-reported hearing loss, as well as two others who were multilingual. Next, preschool monolingual Spanish-speaking children were surveyed; 42 children were included in the final sample (range: 5;1 – 7 years, mean age = 69.74 months, or 5;10 years, SD = 5.42 months). Due to similar speech and language qualifications, one child was excluded on account of dyslexia and one by virtue of being bilingual. The study took place in Mexico City, Mexico; all participants reported residing in various locations around the greater-metropolitan area.

3.3 Procedures

Our population of adults consisted of students at a major university and a major hospital located in Mexico City. Prior to presenting the actual experimental stimuli, participants were given a brief explanation of the task and asked to give written consent about their participation. They then filled out the aforementioned eligibility survey about history and language use. The research team supported participants in both sets of forms, answering questions and clarifying directions.

The child participant population was mostly recruited from a variety of Mexico City preschools. Research team members presented a brief information session to parents and/or spoke with parents one-on-one at the school drop-off, depending on the logistics of the location.

Parents who wished for their children to participate were given a consent form and a brief questionnaire about their child's language history. Following the survey, children completed the experimental stimuli (described in detail in the following section) in a quiet room in their school. For both age groups, the experiment lasted between 20-30 minutes.

The present study uses a between-subjects methodology, in which subjects are divided such that no group receives the same combination of stimuli or conditions. The rationale for this decision stems from previous work in English, in which participants faced with multiple phonetic forms of the English quantifier *some* (Grinstead et al., 2010); due to confusion about the task at hand, participants appeared to develop answering "strategies" that clouded results. Thus, we distributed participants into one of two quantifier conditions (*unos* vs. *algunos*), and one of two QUD conditions (*cúantos* vs. *quiénes*). Both age groups, adults and children, were then distributed under these two conditions. The distribution of participants is seen in Table 2.

	Adults (n = 60)		Children (n = 42)	
	Quienes	*Cuantos*	*Quienes*	*Cuantos*
Unos	15	15	9	9
Algunos	15	15	11	13

Table 2. Distribution of participants across experimental conditions

3.4 Experimental Stimuli

The first experiment employs a Truth Value Judgment Task (TVJT) (Crain & McKee 1985), or an experimental set-up that requires participants to accept or reject a certain linguistic structure based on a video or live-acted scenario. Traditionally, a TVJT features two

experimenters: one acting out a story in front of the participant while the other takes on the role of the observer, through a puppet or character, that watches the story along with the participant. At the end of the story, the observing researcher via the puppet utters the target expression conveying what happened in the story. The participant then has to judge whether the puppet accurately describes what happened in the story, by responding "yes" or "no" to the question "Was the puppet right?" Usage of a TVJT for like studies has been seen in Guasti et al. (2005), Papafragou & Musolino (2003) and Vargas-Tokuda et al. (2009).

This experiment utilized a variation on the traditional TVJT, as first implemented by Padilla-Reyes et al. (under submission). This variation uses stop motion software iStopMotion to create short videos on a MacBook Air. Instead of a puppet, an unseen narrator (voiced by a native speaker of the Mexico City dialect) describes the actions of the stop motion animals (the characters from the Peppa Pig TV program) in the videos. The videos and recordings allowed experimenters to control various aspects of the context – including prosody, Conversational Common Ground, and QUD – as well as consistently present the contextual variables for each participant.

The Question Under Discussion

A unique dimension of our experiment is that it takes extra consideration regarding the target expression voiced by the unseen narrator. We began by assuming that the QUD would matter in that it impacts the implicature generation. Thus, we proceeded to compare two possible QUDs, *quiénes* (who?) and *cuántos* (how many?). Below we have presented the two different dialogues, voiced by the narrator, that contain the two different Questions under Discussion; the QUDs are noted in bold type in both the English and Spanish transcriptions.

1. *“Los animales están durmiendo en la granja tranquilos. ¡Oh no! El perro se escapó.* ***¿Quiénes lo atraparán?*** *Ya sé quienes. Todos los cerditos atraparon al perro.”*

   The animals are peacefully sleeping on the farm. Oh no! The dog escaped. **Who will catch it**? I already know whom. All the piggies caught the dog.

2. *“Los animales están durmiendo en la granja tranquilos. ¡Oh no! El perro se escapó.* ***¿Cuántos cerditos atraparán al perro****? Ya sé cuantos. Todos los cerditos atraparon al perro.”*

   The animals are peacefully sleeping on the farm. Oh no! The dog escaped. **How many piggies will catch the dog?** I already know how many. All the piggies caught the dog.

Figure 1: A screen grab of the stop motion videos.

As we observe, the underlined answers to the QUD were the same (“all of the piggies caught the dog”). The QUDs are structurally similar and, in this instance, interchangeable in such a way that the same answer could be felicitous for both. Despite their similarities, namely that

both *quiénes* and *cuántos* lend themselves to a "some, but not all" implicature, they are different nonetheless. The structure of *cuántos* + noun (i.e. *cerditios*, or piggies) carries a presupposition of 1) the existence of the subject and 2) of the existence of a subgroup of unit set (in this case, piggies). *Quiénes* merely presupposes the existence of a subject, but makes no quantitative claims about the nature of said subject. Consider the sentences presented in examples 6 and 7:

6. ¿*Quiénes lo atraparán*? (Who caught it?)
7. ¿*Cuántos cerditos atraparán al perro*? (How many piggies caught the dog?)

Here we clearly note the distinction in what each quantifier presupposes. Sentence 6, "who caught it?", does not require the speaker to specify the subject to whom they are referring. However, the question "How many piggies caught it?" would not be felicitous without first specifying that a certain subject, i.e. piggies, is whom we care to focus on. We could not begin to concern ourselves with the number of the subject without first establishing that one exists.

In short, while *quiénes* simply generates the quantity implicatures of who, *cuántos* moves beyond who into questions surrounding which members of who. We suspected, then, that the more specific QUD of *cuántos* would have more success in generating an implicature.

Materials

Each participant was presented with 12 experimental scenarios, 6 filler scenarios and 4 warm-up scenarios (see appendix for complete list). Of the 22 total scenarios, 5 were in the 0/4 condition, 6 were the 3/4 condition, and 11 contained the 4/4 condition, with varying quantifiers across conditions. The purpose of the warm-up scenarios was to familiarize participants with the

TVJT format. In particular, the warm-up items, shown in sentences 8 and 9, asked participants to accept or reject whether the characters in the stop-motion movie (the Peppa Pig characters- a family of popular cartoon pigs) managed to catch a dog that had escaped. In the warm-up items, either all of the pigs trapped the dog or none of the pigs trapped the dog. Feedback was given to participants if they did not appear to understand the task during the warm-up; no feedback was given during the experimental task. The six filler items, examples of which are shown in 10 and 11, were randomly distributed throughout the experimental items and consisted of similar *todos* (all) sentences. Only participants who scored above chance on the 6 fillers (significantly above chance = 6 of 6 correct) were retained in the sample. 6 adults and 8 children were excluded for not answering fillers correctly, suggesting that they were not paying attention or did not understand the task.

Example training sentences:

8. *Todos los cerditos atraparon al perro* (4 of 4)
   All of the pigs trapped the dog

9. *Todos los cerditos atraparon al perro* (0 of 4)
   All of the pigs trapped the dog

Example filler sentences

10. *Todos los cerditos cerraron la puerta* (0 of 4)
    All of the pigs closed the door

11. *Todos los cerditos rescataron el caballo* (4 of 4)

All of pigs rescued the horse

As indicated in the procedures, the between-subjects format of our methodology yielded 8 experimental conditions, varying by age, quantifier, and QUD. Table 3 summarizes these conditions. Each target sentence followed the structure in 12. Every target sentence began with one of the two quantifiers (*unos* / *algunos*) followed by the Spanish word for pigs (*cerditos*) followed by a verb with an indefinite DP. See appendix for complete list.

12. [*unos* / *algunos*] *cerditos* [VP…]

Some pigs VP….

Condition	**Age**	**Quantifier**	**QUD**
A	Adult	*Algunos*	*Quienes*
B	Adult	*Algunos*	*Cuantos*
C	Adult	*Unos*	*Quienes*
D	Adult	*Unos*	*Cuantos*
E	Child	*Algunos*	*Quienes*
F	Child	*Algunos*	*Cuantos*
G	Child	*Unos*	*Quienes*
H	Child	*Unos*	*Cuantos*

Table 3. Experimental Conditions

Example target sentences

13. *Algunos cerditos abrieron la puerta* (3 of 4)

    Some pigs opened the door

14. *Algunos cerditos levantaron el elefante* (4 of 4)

    Some pigs lifted the elephant

15. *Unos cerditos movieron el elefante* (3 of 4)

    Some pigs moved the elephant

16. *Unos cerditos rescataron al caballo*. (4 of 4)

    Some pigs rescued the horse.

3.5 Results

Descriptive Statistics

We will start with the descriptive statistics. The two categories of contexts that children were provided with were 1) scenarios in which, for example, 3 of 4 piggies trapped a dog 2) scenarios in which, for example, 4 of 4 piggies trapped a dog. As we can see in the following table, we find across the boards acceptance of both kinds of quantifiers, with both kinds of QUDs, when 3 of 4 agents (e.g. piggies) are carrying out an action (e.g. trapping a dog).

QUD	Quantifier	Adult Acceptance Percentage (mean rating/total possible)	Child Acceptance Percentage (mean rating/total possible)
Quiénes	*Unos*	98% (5.87/6)	98% (5.85/6)
	Algunos	99% (5.93/6)	89% (5.36/6)
Cuántos	*Unos*	92% (5.533/6)	98% (5.89/6)
	Algunos	100% (6/6)	100% (6/6)

Table 4 – Descriptive Statistics – 3 of 4 Condition

Figure 2 - 3 of 4 Condition, *Algunos/unos cerditos atraparon al perro.* "Some piggies caught the dog."

In contrast, from the 4 of 4 condition, in which it is possible for a "some, but not all" implicature associated with *algunos* to be observed, we find *algunos* being treated differently from *unos*, at least by adults.

Figure 3 – 4 of 4 Condition *Algunos/unos cerditos atraparon al perro.* "Some piggies caught the dog."

QUD	**Quantifier**	**Adult Acceptance Percentage (mean rating/total possible)**	**Child Acceptance Percentage (mean rating/total possible)**
Quiénes	*Unos*	26% (1.53/6)	92% (5.54/6)
	Algunos	0% (0/6)	85% (5.09/6)
Cuántos	*Unos*	45% (2.73/6)	91% (5.44/6)
	Algunos	6% (0.4/6)	98% (5.89/6)

Table 5 – Descriptive Statistics – 4 of 4 Condition

Ordinal Regression

Due to the nature of our study, we chose to evaluate our statistics with a logistic regression for ordinal dependent variables. In order to do so, we treat the 6 TVJTs as levels of an ordinal scale, yielding 7 possible levels, between 0 and 6. Each increasing number of acceptance

of TVJTs produces a higher rating on this ordinal scale, which we treat as our dependent variable. We use our 3 independent variables (each of which is 2-valued) as categorical predictors. We fit the first model with answers to scenarios in which 3 of 4 agents engage in an action and a second model, in which 4 of 4 agents are engaging in an action.

Beginning with the scenarios in which 3 of 4 agents participate in an action, we use an interaction model to test for main effects of Age, Quantifier and QUD. The -2 log likelihood statistic comparing this main-effects model to the intercept-only model yields a chi-square value of 3.018 (df = 3), which is non-significant (p = .389). Further, there are no main effects of any predictor variables. This is what we would expect for adult Spanish-speakers, given that both *unos* and *algunos* seem acceptable when less than all of a set of participants engages in an activity. It is interesting to note that children are not different from adults in this way, as illustrated in the following bar graph.

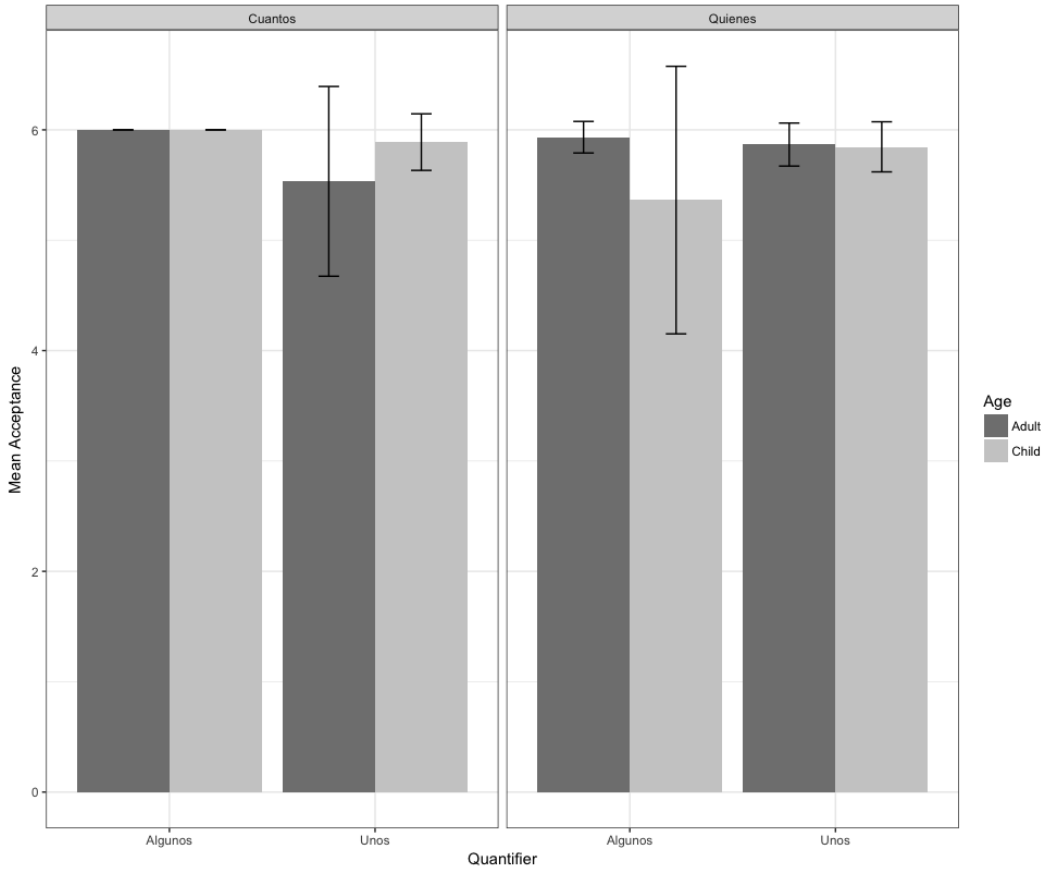

Figure 4 – Mean Acceptance Rate of Children and Adults With Quantifiers *unos* and *algunos* in *cuántos* and *quiénes* QUD Conditions, With 3 of 4 Agents Performing the Action

We move now to the scenarios in which 4 of 4 agents participate in an action, scenarios in which a "some, but not all" implicature could be generated with *algunos*. Upon inspecting our data, we discover that the great majority of responses were either 0 or 6, with a very small proportion of 1, 2, 3, 4 and 5 answers. For this reason, we collapse the 1, 2, 3, 4 and 5 answers into a single 1-5 variable, giving our dependent ordinal variable 3 values: 0, 1-5, and 6. An ordinal regression model with these variables passes the Test of Parallel Lines with a nonsignificant value (X^2 =.243, df = 3, p = .970), indicating that our assumption (that the relationship between independent and dependent variables are the same across the cumulative splits of the data) is correct.

Proceeding to our ordinal regression model with the collapsed dependent variable values, we test for main effects. In this case, the -2 log-likelihood statistic, comparing this model to the intercept-only model, yields a significant chi-square of 79.493, df = 3, $p < .001$, with a Nagelkerke Pseudo R-square of .637. Further, significant main effects are found for both Age (B = -4.512, SE = .714, $p < .001$) and Quantifier (B = 1.843, SE = .618, $p = .003$). Because there was no significant effect of QUD ($p > .05$), which coheres with our visual inspection of the following graph, we fit a group comparison model, without QUD, to explore possible group differences.

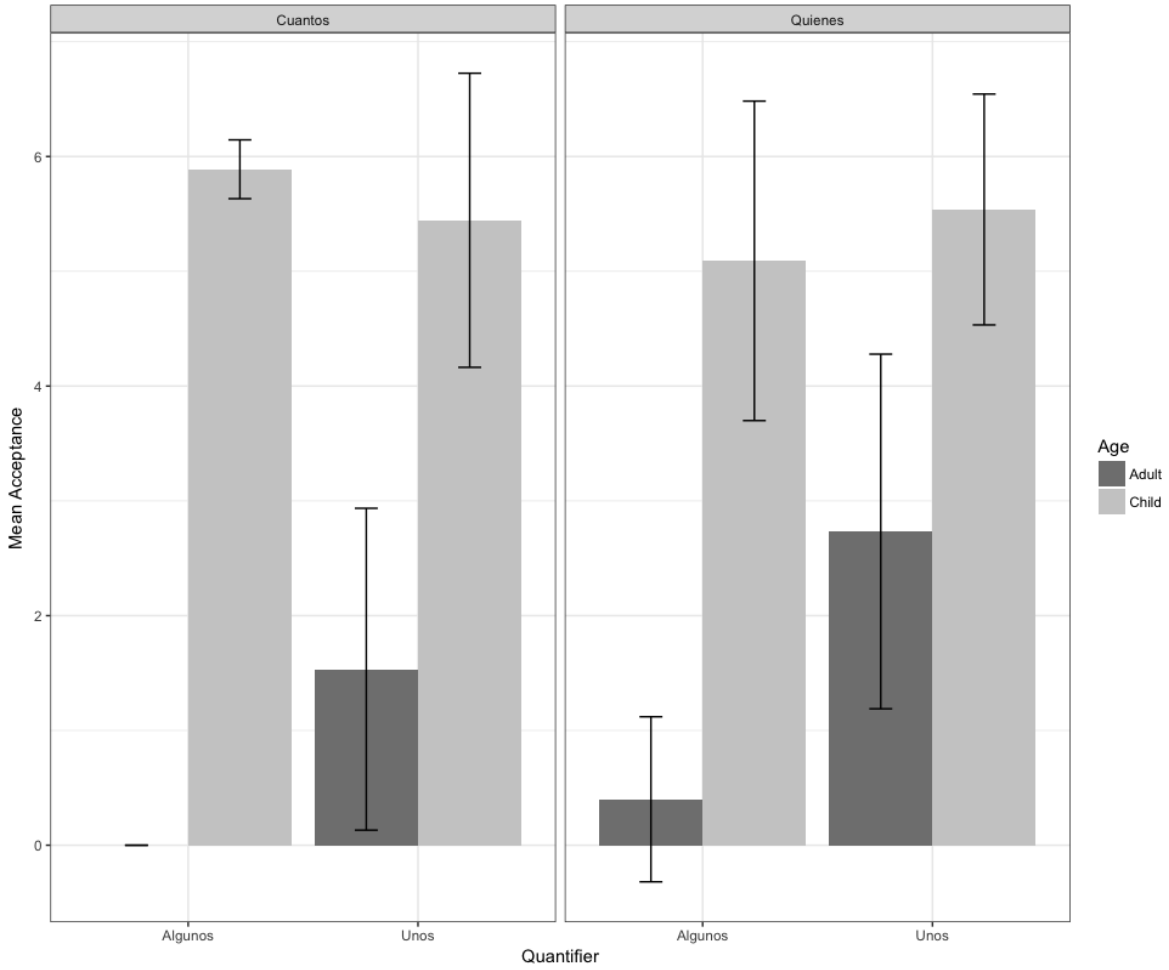

Figure 5 – Mean Acceptance Rate of Children and Adults With Quantifiers *unos* and *algunos* in *cuántos* and *quiénes* QUD Conditions, with 4 of 4 Agents Performing the Action

Having removed the non-significant QUD variable from consideration, we can examine the specific combinations of age and quantifier that we are interested in, by creating a "group" variable to construct a group comparison model, which includes only the four-level group predictor variables (adult-*algunos*, adult-*unos*, child-*algunos*, child-*unos*) and the three-level response variable (0, 1-2-3-4-5, 6).

In our group comparison model, we find that adult *unos* was accepted significantly less than was child *unos* (B =3.4341, SE = .838, $p < .001$) and that adult *algunos* was accepted significantly

less than was child *algunos* (B = 5.349 SE = 1.003, p < .001). Further, while adult *unos* was accepted significantly more than was adult *algunos* (B = 2.458, SE = .824, p = .003), there was no significant difference between child *unos* and child *algunos* (p > .05) These comparisons are illustrated in the following graph, which removes the QUD variable, and collapses responses across the QUD conditions.

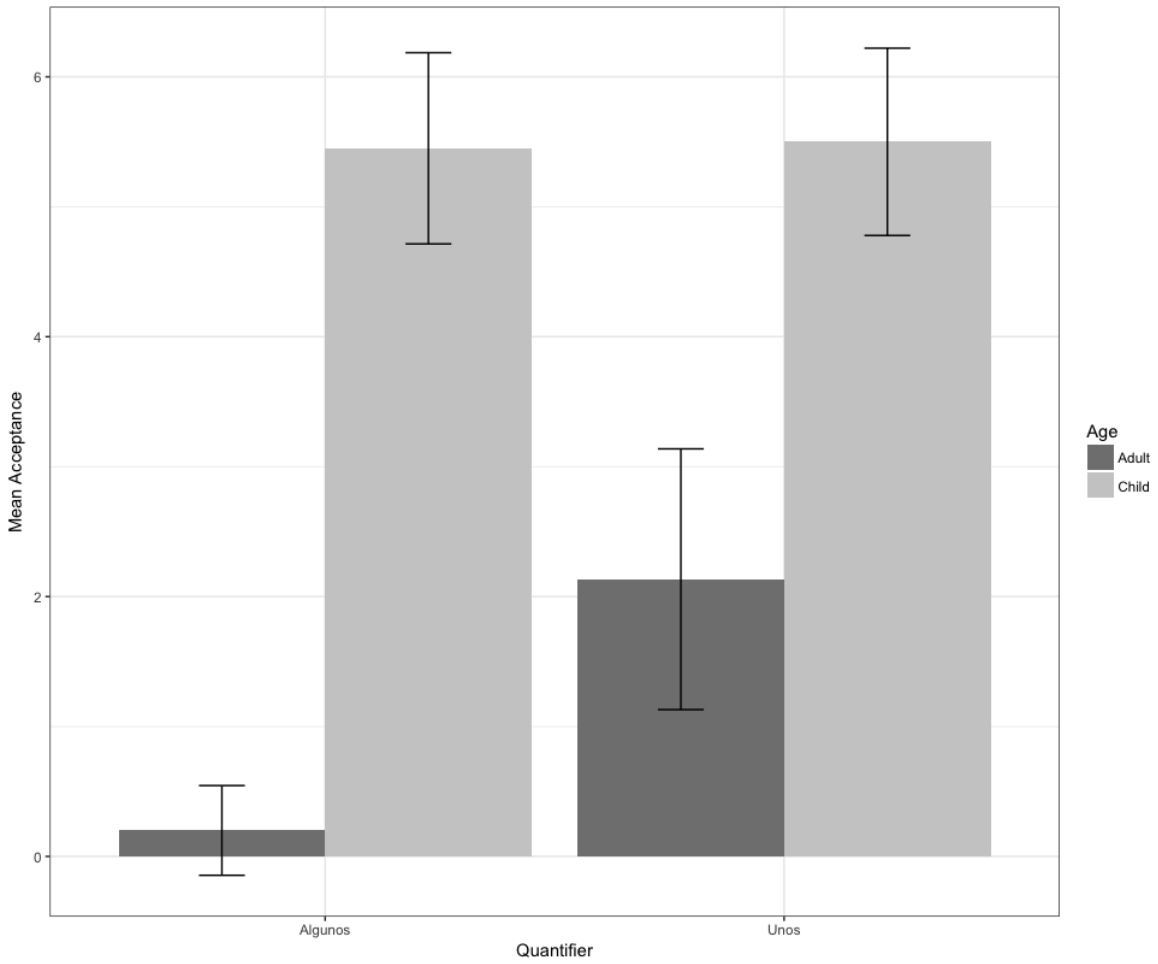

Figure 6 – Mean Acceptance Rate of Children and Adults With Quantifiers *unos* and *algunos* Across Both QUD Conditions, with 4 of 4 Agents Performing the Action

Chapter 4 – Discussion

Returning now to the previously posed research questions, the first question asked if the use of an explicit Question Under Discussion would facilitate in participants' generation of implicatures. Having now analyzed the statistics, we found that in contexts where 4 out of 4 agents completed the action (i.e. 4 piggies rescued the horse), adult participants only accepted *algunos* 3% of the time (mean acceptance = 0.2/6 possible). This response rate leads to the conclusion that these speakers generated the "some, but not all" implicature associated with *algunos* for a striking 97% of their responses. For this kind experimental work, this is a starkly categorical mean response (see contrasts in Table 1). The adults in Vargas-Tokuda et al. (2009), for comparison, generated this implicature 80% of the time. Though there are other differences between this TVJT and the one used in Vargas-Tokuda et al., perhaps the adult results are more categorical because of the inclusion of the explicit QUD. Additionally, our first question also considered the role of the between-subjects experimental design in creating more categorical results. While we did not create a group outside of the between-subjects design for comparison (i.e. participants who listened to all of the sentences), the rather categorical results and low mean acceptance of the adults could be viewed as potential indicator of the success of this experimental design, as compared to Vargas-Tokuda et al. (2009).

In order to answer our second research question, however, we must first acknowledge an interesting difference between our initial hypothesis and findings. As aforementioned in the Methods, we anticipated variation between the two QUDs because of what each one presupposes (i.e. *quiénes* generates the quantity implicatures who?; *cuántos* goes beyond who into questions surrounding which members of who carried out particular actions). We additionally suspected that certain combinations of QUDs and quantifiers would seem more acceptable to participants,

as well as more pragmatically felicitous; this prediction is largely due to *unos* maintaining the "some but not others" interpretation in more contexts than *algunos* (Vargas-Tokuda et al., 2009), such that *unos* seemed to better answer the QUD which contained *quienes* (*Quienes atraparon el perro*). Nevertheless, these subtleties seemed lost in the data; participant responses did not vary as a function of the QUD, as there was no significant difference ($p > .05$) across the different QUD conditions for either age grouping. Thus, disregarding this condition, we can begin to discuss some interesting findings surrounding the quantifiers.

When the two age conditions are compared, there is a noticeably different treatment of quantifiers, and the subsequent implicatures they generate. In the present study, children generated dramatically fewer implicatures with *algunos* than adults in the 4/4 condition; adults, again, generated the "some, but not all" implicature 97% of the time, while the children only did so 15% of the time. Additionally, this child rate is lower than that of the children in Vargas-Tokuda et al. (2009). We speculate that this might be attributable to predicate type, namely, the difference between distributive and collective. This difference can be seen in Vargas-Tokuda et al, which utilized a distributive predicated type wherein actors consecutively preformed an action (i.e. 4 rabbits jumped, one after the other, over a girl.) However, in our predicates, the actions were not consecutive and distributive, but rather simultaneous and collective, e.g. 4 little pigs trap a horse together, all at once. We suspect that there may have been something about the repeated, consecutive actions in the previous experiment that highlighted the partitivity of the action, in contrast to the current experiment, in which at least some participants were led to wonder (and verbalized) whether the experiment was fundamentally about event completion. While this may have been an important factor for children, it was not for adults, who gave categorical responses consistent with the generation of an implicature. Thus, we are faced with a

more specific developmental question than was faced, for example, in Noveck (2001), in which adults generated implicatures 59% of the time and children generated them 11-15% of the time. Given highly categorical adult responses (i.e. adult implicature generation in nearly 100% of the cases), this suggests that the difference in our task between adult and child performance represents a real developmental difference.

Having evaluated predicate structure, our third research question considered the potential role of utilizing a variety of predicates. Unlike Vargas-Tokuda et al. (2009), who only included one predicate in their Experiment 1 stimuli (*brincar sobre la niña*, or "jump over the girl"), the stimuli for this present study employed a variety of verbs: *rescatar al caballo, abrir la puerta, atrapar al perro, mover al elefante, levanter al elefante,* and *cerrar la puerta*, or respectively, "to rescue the horse," "to open the door," "to catch the dog," "to move the elephant," "to lift the elephant," and "to close the door." The inclusion of multiple predicates made it more likely that we had removed the potential anomalies that could arise with one particular verb. We know that adults, at least, generated implicatures across the board for all of the predicates and not solely because the verb *brincar*, for example, lends itself to strong implicature generation. However, as mentioned, the collective nature of the predicates could be considered a confound. We suggest varying the collective/distributive dimension of predicates in future research, and representing this difference with a variety of verbs.

Similarly, our fourth research question considered the impact of another methodological innovation: does using a video-recorded TVJT improve adult or child performance, relative to existing studies? Conroy et al. (2009) shows that "live" Truth Value Judgment Tasks produce results that are not different from those of video-recorded TVJTs. Thus, while the two ways of performing a TVJT could be considered comparable, we felt it important for this specific task to

use a video recording because of its controlled nature (with specific regard to aspects like replicated prosody, controlled conversational Common Ground, and QUD). Not only did we want to ensure that all participants across a relatively large sample received the same stimuli, we also believe the video format to be more engaging, especially for our preschool aged participants. Additionally, since we, the researchers, travelled to the participants' schools or hospital, the videos eliminated the need for multiple sets of animal figures and allowed multiple RAs to run the study simultaneously. Again, the highly categorical adult results could be attributed to the controlled nature of video recordings. Despite this, however, children still did not seem to generate implicatures, although many commented about their love for Peppa and her friends. Anecdotally, in line with earlier comments about task completion, a particular figure used in the videos seemed to cause confusion: the elephant, from the sentence *unos cerditos movieron al elefante* ("Some piggies moved the elephant"). While all of the other animals used (pigs, horses, dogs) could be commonly found on a farm, which is where the videos took place, elephants are not. In order to eliminate other pragmatic confounds, we recommend paying extra attention details such as animal type in future trials.

Lastly, we turn to our fifth and final research question. With regard to the differential treatment of *unos* vs. *algunos*, adults were categorical in their treatment of the two quantifiers as distinct. Children, in contrast, appeared to treat them as interchangeable. Adults, critically, either treated *unos* as pure existential, allowing it in 4/4 contexts, or interpreted it with the contrastive *unos, pero no otros* ("some but not all") meaning, and thus rejected it. This distinction for *unos* seems to be unconnected to grammatical features of the sentence, in contrast to *algunos*, which seems to change its meaning as, at least, a function of the syntactic-semantic context it occurs in (e.g. Vargas-Tokuda et al. 2009).

In sum, children did not appear to generate a "some, but not all" implicature in this experiment and they did not appear to treat *unos* as different from *algunos,* as they have in previous experiments. Nonetheless, we found that adults behaved more categorically in this experiment than in previous experiments, in both regards. In future research, we will attempt to isolate and directly compare the distributive-consecutive vs. collective-simultaneous distinction to determine whether it is of consequence for generating implicatures. We also hope to be able to examine this phenomenon in non-typically developing populations, like children with SLI (Specific Language Impairment).

Chapter 5 - References

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Appendices

Warm-up Sentences (Each presented in contexts in which all agents acted (4/4) or no agent acted (0/4) – total of 4 sentences)

Todos los cerditos atraparon al perro. (4/4, was then explained by the research assistant)

Todos los cerditos atraparon al perro (0/4, was then explained by the research assistant)

Todos los cerditos rescataron al caballo. (4/4)

Todos los cerditos rescataron al caballo. (0/4)

Filler Sentences (Each presented in contexts in which all agents acted (4/4) or no agent acted (0/4)– total of 6 sentences)

Todos los cerditos atraparon al perro.

Todos los cerditos cerraron la puerta.

Todos los cerditos rescataron al caballo.

Experimental Sentences (Each presented in contexts in which 3 of 4 agents acted or 4 of 4 agents acted – total of 6 sentences per participant, as a result of between-subjects design)

Algunos/Unos cerditos rescataron al caballo.

Algunos/Unos cerditos abrieron la puerta.

Algunos/Unos cerditos atraparon al perro.

Algunos/Unos cerditos movieron al elefante.

Algunos/Unos cerditos levantaron al elefante.

Algunos/Unos cerditos cerraron la puerta.

Guion Para el TVJT **– Script for the TVJT, as was read to participants**

1. El video que se va a usar tiene que estar en el disco duro de la computadora que se va a usar para el experimento.

2. Te sientas en un lugar con poco ruido y ajustas el volumen de la computadora para el ambiente.

3. Los primeros 4 reactivos son para familiarizar al participante con el formato. Antes de poner el primer escenario, le dices al participante algo así:

> Te voy a enseñar unos escenarios grabados en video. Habrá unos muñequitos que hacen ciertas acciones y una voz que lo narra. Al final del escenario, la voz dirá una oración y tu tarea es decirme si esa última oración de la voz es correcta (en ese caso me dices "sí") o si se equivoca (en ese caso me dices "no"). ¿De acuerdo?
> Vamos a ver el primero.

El primero tiene un perro que se escapa y los 4 cerditos lo atrapan. La voz al final del escenario dice, "Todos los cerditos atraparon al perro."

4. Primero, averiguas que sí puede oír lo que dice la voz.

5. Entonces, si el participante dice "sí" sin que le digas nada, sigues al siguiente escenario. Si no, le dices explícitamente algo así:

> En los eventos de ese escenario, de hecho, todos los cerditos atraparon al perro, así que en este caso la respuesta correcta sería "sí".

6. Entonces, pasas al siguiente escenario en el que ningún cerdito logra atrapar al perro, pero la oración es la misma. De nuevo, si el participante no te dice sin que digas nada "no", le explicas algo así:

> En este escenario, de hecho, ningún cerdito atrapó al perro, así que la última oración de la voz que dice que "Todos los cerditos atraparon al perro." es falso. Por tanto, esta vez la respuesta sería "no".

7. Entonces, le muestras los siguientes dos escenarios con el mismo sistema, animándole, de ser necesario, a que dé la respuesta sin tu explicación. Si es necesario, todavía se puede dar explicación. Si al final de los 4 escenarios no ha logrado entender el formato, puedes darle el resto del experimento rápidamente para no insultarlo, pero anotas que sus resultados no cuentan.

8. Entonces pasas a los reactivos experimentales. Haces pausa después de cada escenario de manera que la pantalla quede en negro y anotas su "sí" o su "no" en tu hoja de respuestas (impresa en papel). Después de terminar, le das las gracias por haber participado. Entonces pones los resultados en nuestra hoja Excel Google y pones la "copia dura" de la hoja de respuestas con su código en la carpeta.

Background Questionnaire About Speech and Hearing History – Adults

Lenguaje – Datos Básicos – Grupo Control, Adultos

Nombre y apellidos_____

Fecha de nacimiento_____

1. Audición

¿Tiene problemas para oír? Sí No No sé

¿Ha tenido infecciones de los oídos recientemente? Sí No No sé

2. Lenguaje

¿Escucha otro idioma aparte del español de manera regular? Sí No

De ser así, ¿qué idioma es y con qué frecuencia?_____

¿Alguien ha expresado preocupación acerca de su lenguaje o habla alguna vez? Sí No

De ser así, ¿cuál era la preocupación?_____

¿Tiene antecedentes de problemas con el lenguaje o el habla? Sí No

¿Alguna vez han hecho un estudio clínico de su habla o lenguaje? Sí No

De ser así, ¿cuándo y por qué razón?_____

¿Hay alguna historia de problemas con el lenguaje o el habla en su familia? Sí No

De ser así, ¿de qué clase?_____

¿Cuál es la relación de parentesco con esa persona (ej. tío, abuela,

etc.)?_____